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Fuel Fabrication

Fuel fabrication facilities convert enriched UF₆ into fuel for nuclear reactors. Fabrication also can involve mixed oxide (MOX) fuel, which is a combination of uranium and plutonium components. NRC regulates several different types of nuclear fuel fabrication operations.

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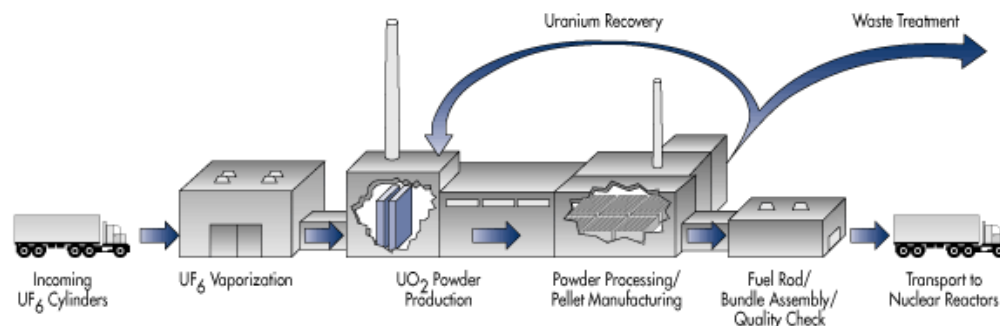
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See [Location of Major Fuel Cycle Facilities](#) for a list of these facilities licensed by NRC.

Light Water Reactor Low-Enriched Uranium Fuel

Fuel fabrication for light (regular) water power reactors (LWR) typically begins with receipt of low-enriched uranium (LEU) hexafluoride (UF₆) from an enrichment plant. The UF₆, in solid form in containers, is heated to gaseous form, and the UF₆ gas is chemically processed to form LEU uranium dioxide (UO₂) powder. This powder is then pressed into pellets, sintered into ceramic form, loaded into Zircaloy tubes, and constructed into fuel assemblies. Depending on the type of light water reactor, a fuel assembly may contain up to 264 fuel rods and have dimensions of 5 to 9 inches square by about 12 feet long.

Typical Light Water Reactor Fuel Fabrication Facility



Light Water Reactor Mixed Oxide Fuel

MOX fuel differs from LEU fuel in that the dioxide powder from which the fuel pellets are pressed is a combination of UO₂ and plutonium oxide (PuO₂). The NRC was directed by Congress to regulate the Department of Energy's (DOE's) fabrication of MOX fuel used for disposal of plutonium from international nuclear disarmament agreements. For more information about this fuel, see [Mixed Oxide Fuel Fabrication Facility Licensing](#).

Nonpower Reactor Fuel

Nonpower reactors are much smaller reactors that do not generate electrical power but are used for research, testing, and training. Nonpower reactors can include research reactors and reactors used to produce irradiated target materials. The fuel design varies with the reactor type and manufacturer. Plate-type fuel consists of several thin plates containing a uranium mixture clad with aluminum. Another fuel is in the shape of rods and consists of a uranium and zirconium/hydride mixture. There are also compact, self-contained, low-power (less than 5 watts) tank-type reactors. Although use of highly enriched uranium (HEU) fuel can reduce the size of a nonpower reactor, the NRC adopted a policy of discouraging use of HEU fuel. This policy is reflected in [10 CFR 50.64](#).

Other Types of Fuel Fabrication Facilities

NRC also regulates some fuel fabrication facilities that have DOE contracts to down-blend HEU with other uranium to create LEU reactor fuel. The HEU being blended down to lower enrichment comes from Russian or U.S. weapons programs as part of an international arms control agreement.

Safety Concerns at Fabrication Plants

Chemical, radiological, and criticality hazards at fuel fabrication facilities are similar to [hazards](#) at enrichment plants. Most at risk from these hazards are the plant workers. These facilities generally pose a low risk to the public.



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